DEPARTMENT OF MINES
SOUTH AUSTRALIA

Report on

GEOLOGICAL SURVEY OF ROADBUILDING MATERIAL

PORTIONS OF COUNTIES LIGHT & STANLEY

(District Council of Saddleworth)

by

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GEOLOGICAL SURVEY

CONTENTS

MAP REFERENCE

PLAN NO.	TITLE	SCALE
62-627	Regional Geology & Road Metal Deposits. District Council of Saddleworth.	1 inch to 1 mile approx.

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GEOLOGICAL SURVEY OF ROAD BUILDING MATERIAL

PORTIONS OF COUNTIES LIGHT & STANLEY

(DISTRICT COUNCIL OF SADDLEWORTH)

1. ABSTRACT

The known deposits of road metal are described and related to the regional geology. The report discusses reconnaissance mapping carried out in the Hundreds of Saddleworth and Waterloo, Co. Light and Hundred of Stanley, Co. Stanley with particular reference to the occurrence of new deposits of road metal.

2. INTRODUCTION

The District Council of Saddleworth obtains material from three deposits of fractured shale and siltstone for the construction of local roads. However all of these are situated in the southern part of the Council area and haulage of material to the more distant parts of the District accounts for a substantial portion of construction costs.

Following a request from the District Clerk a survey of the eastern and northern portions of the Council area was conducted during August 1962, to locate new quarry sites. The main requirement for a suitable deposit is that the material can be obtained by bulldozing and ripping without resorting to blasting and crushing.

3. PREVIOUS WORK

Regional geological mapping has been carried out previously in the western and northern parts of the area under review and this work has been used as a basis for extending the mapping into the Council area.

Wilson (1952) mapped and described the rocks in the belt of country between Riverton and Clare and carried out some reconnaissance mapping to the east of Saddleworth.

Reference has also been made to mapping by Forbes (1962) on the Clare Military Sheet which is currently in progress.

4. GEOLOGICAL SETTING

Basement rocks in the area belong to the Adelaide System of Proterozoic Age and occur in a conformable sequence of shale, siltstone, quartzite, tillite and dolomite.

The succession as established and described by Wilson (1952) is, from the base upwards, as follows

River Wakefield Group - sandy phyllites, quartzites and minor dolomites. These do not outcrop in the Council area.

Rhynie Sandstone - ilmenitic feldspathic sandstone with frequent shaley bands and interbedded dolomites.

Skillogalee Dolomites - cream dolomites with interbedded dolomitic shales, grading to blue-grey dolomite at the top.

Woolshed Flat Shales - light grey well banded shales and sandy shales.

Undalya Quartzite - well bedded medium grained white and cream quartzite with interbedded carbonaceous and pyritic shales.

Auburn Dolomites - thin bands of dark grey dolomite interbedded with blue-grey dolomitic silty shales and shaly sandstones. Divided in some areas into Lower and Upper members by the Watervale Sandstone.

Mintaro Shales - light grey, blue-grey and light fawn shales, silty and sandy in part.

Gilbert Range Quartzite - white feldspathic quartzite and interbedded tillite and fluvioglacial sediments.

Stratigraphically above the Gilbert Range Quartzite in the Marrabel - Black Springs area are brown, yellow brown and grey shales and siltstones, pyritic in part.

The quartzite members of the succession, particularly the Gilbert Range Quartzite, outcrop as prominent ridges and reflect the geological structure of the area. The accompanying geological plan and section shows a syncline, trending north-south through the centre of the area. This is flanked to the east and west by anticlines. Softer silts and shales occupy the

broad shallow valleys between the quartzite ranges and are now covered extensively by soil and alluvium of Recent Age.

There is evidence of a major regional fault trending north-south through the centre of the area mapped. Wilson (1952) recorded this structure in the south near Marrabel and this projects towards faulted zones mapped during the present survey at Rickett's Quarry and in a railway cutting north of Manoora.

To the west of this fault, where there is more relief in the topography and outcrop is better, the beds on the limb of the regional anticline are locally tightly folded. However, to the east the folds appear to be broad and open although locally contorted zones could be present under the extensive soil cover.

5. ROAD METAL DEPOSITS

Metal is obtained from three quarries at the present time, although several other deposits have been worked on a small scale in the past.

Rickett's Quarry (Section 3079, Hd. Saddleworth)

This is the largest and most extensively used in the district. The material is derived from thinly bedded and intensely fractured shales and sandy shales and this makes an excellent road. These beds directly overlie a cream dolomite (Skillogalee Dolomite) and have an overall dip of 65-70° to the east although many contortions and minor folds are present. The quarry has been developed at various levels and the rocks exposed on the floor are not strictly comparable because of the effect of weathering which acts in a vertical direction. Nevertheless it seems that there is a central zone (now worked out to the present floor level) of higher quality grey shale which is flanked to the west by slightly inferior quality (although still of good grade) brownish shale and siltstone. To the east of the central zone there remains a high 'island' of fractured grey and brown shale. Just beyond the northern

end of the quarry the dolomite swings easterly in a tight fold and then strikes northerly parallel to the Gilbert River. The deposit owes its intense fracturing to the tight folding which has occurred and because of this workable material can be expected to continue to some depth below the present quarry floor. Removal of the 'island' flanking the present cut will allow the pit to be worked to greater depth. Some trial trenching should be carried out on the slopes to the Gilbert River north of the present workings.

Fraser's (Section 8, Hd. Saddleworth)

Soft grey and brown siltstones belonging to the Auburn Dolomites outcrop in the bend of a creek. This material does not make as good a road as that from Ricketts. The beds are not extensively fractured and owe their workability to surface and stream weathering. Reserves will thus be limited both at depth and to the south away from the stream bank, but further workable deposits should be available in similar locations along this and neighbouring streams.

Michalanney's (Section 237, Hd. Waterloo)

Closely fractured weathered siltstones of the Mintaro Shales are quarried from the top of a prominent rise. The material makes a good quality road except that it is very dusty in the summer. The rock is less weathered and therefore harder in the floor of the present pit and the tendency for the rock to disintegrate to fine dust will probably diminish as the pit is worked deeper. The close fracturing still persists in the quarry floor and probably large reserves remain in this deposit.

Small quarries have been worked in the past from the following localities. In all of these the intense fracturing typical of Rickett's and Michalanney's is absent and the workability depends on weathering of the near surface rock. As a consequence the pits are all shallow and many irregular

patches and 'reefs' of unworkable material protrude from the quarry floors.

Section 121, Hd. Waterloo (Rohde's)

Blue-grey and grey siltstones and finely sandy shales are exposed in the pit. The rocks belong to the Mintaro Shales.

Section 264, Hd. Waterloo

Thinly bedded varicoloured shales and sandy shales have been quarried on a rise which lies across the road from Michalanney's. Numerous small scale crush zones are present but the intense fracturing at Michalanney's is absent here and the quarry floor is shallow and extremely irregular.

Section 34, Hd. Saddleworth (Behn's)

A deep cut has been excavated through a ridge underlain by yellow-brown and grey pyritic shales and siltstones of the post Gilbert Range Quartzite group. The material makes an excellent road but as the beds are tough and unfractured, quarrying is difficult below the weathered zone.

Section 114, Hd. Saddleworth

Varicoloured shales and sandy shales of the Mintaro Shales are exposed in a large quarry which has been worked to a maximum depth of about 15'. The rocks are not fractured and their workability is due to surface weathering. The material is of poor quality and suitable only for second class roads or as a base course for the construction of first class roads.

Section 471, Hd. Stanley

The material in this pit is similar in occurrence and character to the deposit previously described. However the rocks here belong to the post Gilbert Range Quartzite group.

With the exception of Section 471, Hd. Stanley all of these small occurrences are located on the tops of hills. Here the rocks are less weathered (relatively) than on the flatter slopes flanking the rises. It is considered that larger deposits of workable road material will occur under the flatter

slopes and some exploratory work in these locations is recommended.

It is apparent that shales and siltstones from many positions in the stratigraphic column can be used to make satisfactory roads. The problem is to find deposits which are workable by the methods preferred by the Council.

The known occurrences fall into two groups with regard to both quality and quantity of material available.

1) Where the stone is workable because of intense fracturing of relatively unweathered bedrock. Material from this type makes a high quality road because the individual fragments are tough and the proportion of fines is small. Deposits of this type have formed as a result of tight folding and because of this reserves will continue with depth.

2) Where the stone is workable because of weathering of the upper surface of relatively unfractured rocks. Material from this type contains soft fragments of varying size with a large proportion of fines and generally makes an inferior quality road in comparison with the group 1 material. Deposits of this type are workable only to shallow depth.

Mapping carried out during the survey has shown that tight folding of the basement rocks is restricted to a zone flanking the regional fault in the vicinity of Saddleworth and Manoora and further deposits of the group 1 type material will only be found in this area. Deposits of the group 2 type will be widespread throughout the area and pits can be developed close to any desired locality. These should be sought, not as in the past from the hill tops, but from the flatter slopes flanking the high ground. Some exploratory costeaning will be necessary in most cases.

In the valleys containing the River Light and Tothill Creek the most favourable locations for road metal will occur in the centre of the valley where bedding dips at a low angle.

This combined with vertical jointing will give a greater workable depth than at locations nearer to the ranges.

6. POSSIBLE NEW DEPOSITS

The following localities were noted during the survey. This list does not present all of the potential quarry sites in the district and further deposits will be found by applying the principles outlined in the previous section. These are indicated on the accompanying plan.

1. Sections 139 and 166, Hd. Saddleworth

Contorted cream dolomite and shales are exposed in a railway cutting through these two sections. The shales as exposed are deeply weathered but should grade down into harder rock at depth which is closely fractured. Some exploratory work is recommended here as material of similar quality to Rickett's Quarry is likely to occur.

2. Section 284, Hd. Saddleworth

Closely fractured shales probably occur in the nose of the tight fold in the cream dolomite.

3. Section 301, Hd. Stanley

Fractured shaly sandstone is exposed in a trench bordering the road on the north-eastern side of the section. This material will provide second class road metal.

4. Stone Reserve opposite Section 300S, Hd. Stanley

Second class roadmetal probably exists to shallow depth.

5. Section 352, Hd. Waterloo

A dam excavation has exposed grey and yellow sandy siltstones which should make a good road.

6. Section 296, Hd. Waterloo

The northern end of this section is underlain by material similar to that exposed in a small pit on the main road. Here the bedding dips at a low angle and partings along

the bedding planes render this deposit workable to greater depths than usual.

7. Section 345, Hd. Waterloo

Brown weathered shales outcrop along the road bordering this section.

8. Section 87, Hd. Waterloo

Brown and grey weathered shales outcrop adjacent to this and many other local sections.

9. Sections 1004 and 1009, Hd. Waterloo

Brown shales are exposed on the eastern bank of the River Light in both of these sections. Bedding dips at a low angle to the west and partings in this plane will improve the workability of the material.

10. Section 1148, Hd. Waterloo

Brown shales, dipping flatly east, are exposed in the west bank of the River Light. The rock is well broken above creek level by vertical joints intersecting the bedding planes. This deposit is conveniently located near the Marrabel - Budunda Road.

7. SUMMARY & CONCLUSIONS

The area is underlain by rocks of Proterozoic Age, a large proportion of which are suitable for road construction.

The known deposits fall into two groups which are distinctive in both quality and quantity of material available. The differences between the two groups are related directly to the regional geology and it is possible to forecast the extent of the two types throughout the District.

The higher quality material of Group 1 is restricted to a zone of tight folding between Saddleworth and Manoora. However, new deposits classed as Group 2 are widespread throughout the area and should be sought on the flatter slopes of the higher ground between the quartzite ranges.

Because of the restricted occurrence of the better quality material it would be wise to use this only on the upper surface of roads.

Basement rocks are covered by soil over a large area of the eastern and northern portions of the District and although no tight folding is evident in the outcropping quartzites, crumpled zones may occur in the shales concealed by soil. Councillors and the Council staff should examine all new excavations which take place in the District.

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MNH:AGK
25/9/62

REFERENCES

WILSON, A.F. 1952. The Adelaide System as Developed in the Riverton-Clare Region, Northern Mount Lofty Ranges, South Australia. Trans. Roy. Soc. S.A. 75.

FORBES, B.G. 1962. Geological Atlas of South Australia. Clare 1 mile Military Sheet. In progress.

SCALE
approx

Mile 0 1/2 1 2 3 4 Mile

N

Farrel Flat

Porter Lagoon

Black Springs

Lagoon

Wake Field River

Manoora

Auburn

SILTSTONES, SOME DOLOMITES.

Ricketts

Behn's

Light River

Tot Hill Creek

Unoolya

Wake Field River

MAPPED BY SHALES,

NOT UNDERLAIN

Saddleworth

Fraser's

Gilbert River

Riverton

Morrabel

Mcholonney's

Rohde's

A

A'

LEGEND

Shales, siltstones brown, yellow brown and grey

GILBERT RANGE QUARTZITE - white felspathic quartzite and interbedded tillite and fluvioglacial beds

MINTARO SHALES - grey-fown shales, silty and sandy in part & AUBURN DOLOMITES - thinly bedded blue dolomite, dolomitic shales, divided by WATERVALE SANDSTONE in some areas

UNDALYA QUARTZITE - white and cream felspathic quartzite with interbedded shale

WOOLSHED FLAT SHALES - grey shales and sandy shales

SKILLOGALEE DOLOMITES - cream and some blue dolomite and interbedded shales

RHYNIE SANDSTONE - ilmenitic felspathic sandstone with shaley and dolomitic bands

Strike and dip of bedding

Fault

Quarry

Road

Railway

Boundary of District Council Area

Possible new deposits referred to in text (1)

Drawn from uncontrolled photo mozaics

A

River Wakefield

Gilbert River

River Light

Tot Hill Creek.

A'

DIAGRAMMATIC WEST - EAST CROSS SECTION ALONG A-A'

To accompany report by M.N. Hiern

S.A. DEPT. OF MINES

REGIONAL GEOLOGY AND ROAD METAL DEPOSITS
DISTRICT COUNCIL
OF SADDLEWORTH

Associated Drawing No.

No.	Amendment	Exd.	Date

Req. No.
D.M.
Compiled from

Director of Mines

Approved

Passed

Drn. B.L.G.
Tcd.
Ckd.
Exd.

Scale: AS ABOVE

Date 13-9-62

62-627
GK 1